REMARKS

Applicant appreciates the thorough review of the present application as evidenced by the Official Action. In addition, Applicant appreciates the indication that claims 13-22, 35-44 and 57-66 would be allowable if rewritten in independent form. As discussed in detail below, claim 63 is amended to correct the informality. In light of the foregoing amendment and the subsequent remarks, Applicant respectfully traverses the rejection of claims 1, 4-12, 23-24, 27-34, 45 and 48-56 under 35 USC § 102(e) as being unpatenable over U.S. Patent No. 6,295,513 to Thackston and the rejection of claims 2, 3, 25, 26, 46 and 47 under 35 USC § 103(a) as being upatentable over the Thackston '513 patent in view of U.S. Patent No. 4,480,480 to Scott et al., and requests reconsideration and allowance of the present application.

A. The Objection to Claim 63 is Overcome

The Official Action objected to claim 63 because "first" in line 7 should be "second." Claim 63 has been amended to correct the informality, and Applicant therefore submits that the objection of claim 63 is overcome.

B. The Rejection of Claims 1, 4-12, 23-24, 27-34, 45 and 48-56 under 35 U.S.C. § 102(e) is Overcome

The Official Action rejected Claims 1, 4-12, 23-24, 27-34, 45 and 48-56 under 35 U.S.C. § 102(e) as being anticipated by the Thackston '513 patent. As described below, however, the methods, systems and computer program products for design analysis of a component of the claimed invention are not taught or suggested by the Thackston '513 patent.

The Thackston '513 patent discloses a network-based interactive system that supports several phases of an engineering effort: the development and evaluation of an engineering design in a virtual collaborative environment, the identification of qualified fabricators for manufacturing a part design, and the virtual bidding process. During the development and evaluation portion of the effort, designers may choose various materials, dimensions and other properties in conjunction with CAD tools to create the part design (see Col. 13, lines 43-67). In addition, stored standard attributes, such as surface finish, material, tolerance, and the like may

be assigned to each geometrical and topological entity of a part design model. The tolerance attribute may also be given a tolerance range. (See Col. 16, lines 52-67 and Col. 30, lines 5-10). Once a part design model is created, various analyses and simulations may then be carried out on the model to evaluate it. For instance, a stress analysis may use finite element or equivalent numerical analysis techniques to determine the stress distribution throughout the model. (See Col. 25, lines 59-67 to Col. 26, lines 1-12 and Col. 30, lines 59-65). Thus, the current baseline part design model (or parts thereof) is the input, and the output of the analysis is some measure of performance or compliance with applicable specifications (see Col. 27, lines 10-13). The results of the analysis may be stored in the system and the design and/or analysis teams may then discuss, via quasi-real time video, audio and graphics, proposed modifications to the preliminary baseline part design model based on the analyses. Based on such discussions, the design team may make changes to the preliminary baseline part design model. (See Col. 28, lines 42-62 and Col. 32, lines 1-11). After each round of analysis and simulation, the prime contractor determines whether the baseline part design mode is sufficiently mature to begin fabricating prototypes (Col. 29, lines 33-37).

In contrast to the disclosure of the Thackston '513 patent, independent claims 1, 23 and 45 recite methods, systems and computer program products, respectively, for design analysis of a component that includes determining whether the stress response of a finite element model of the component is within pre-selected limits, and, if not, then prompting modification of the design of the component or a user-defined parameter and regenerating the finite element model. As described in pages 25, line 24 to page 27, line17 of the specification, the detailed stress responses of the component are compared to pre-selected limits, as represented by the failure assessment block 46 of Figure 1. The exact causes of the component's unacceptable performance are then determined, such as by determining the cumulative damage index for each part of the component. Thus, the method, system and computer program product of the claimed invention is capable of determining the exact part(s) of the component that are likely to fail and are, therefore, causing the component to not meet the pre-selected limits. (See page 26, lines 1-15 and Figure 13). In addition, the method, system and computer program product of the claimed invention provides a detailed explanation of the reason for each part that fails and prompts the

designer to modify the physical layout of the parts or the user-defined parameters in such a way as to mitigate the effect of the reason for the failure. (See page 26, lines 16-32).

While the Thackston '513 patent discloses a system for development and evaluation of a part design in which the designers may choose various materials, dimensions and attributes, such as surface finish, material, tolerance, and the like, to assign to each geometrical and topological entity of the part design model, it does not disclose any type of determination of whether the stress response of a finite element model of the part design model is within pre-selected limits, and, if not, then prompting modification of the design or a user-defined parameter. The Thackston '513 patent states that the tolerance attribute that may be assigned to each geometrical and topological entity of the part design model may also be given a tolerance range, which would simply indicate a range of values for the particular entity, not any type of pre-selected limit for an overall stress response of the model, unlike the claimed invention. Furthermore, the Thackston '513 patent only discloses performing various types of analyses on a part design model, the output of which is some measure of performance or compliance with applicable specifications, which the design and/or analysis teams may then discuss to propose modifications to the preliminary baseline part design model based on the analyses.

The process described by the Thackston '513 patent is very different from the method, system and computer program product of the claimed invention that automatically determines whether the stress response of the model is within pre-selected limits, and, if not, automatically prompts modification of the design or a user defined parameter, such that the modifications are automatically proposed by the claimed invention and there is not a need for a design and/or analysis team to discuss proposed modifications to the model. Thus, the Thackston '513 patent does not teach or suggest design analysis of a component that includes determining whether the stress response of a finite element model of the component is within pre-selected limits, and, if not, then prompting modification of the design of the component or a user-defined parameter and regenerating the finite element model, as recited by independent claims 1, 23 and 45.

C. The Rejection of Claims 2, 3, 25, 26, 46 and 47 under 35 U.S.C. § 103(a) is Overcome

The Official Action rejected Claims 2, 3, 25, 26, 46 and 47 under 35 U.S.C. § 103(a) as being unpatentable over the Thackston '513 patent in view of the Scott '480 patent. As described below, however, the methods, systems and computer program products for design analysis of a component of the claimed invention are not taught or suggested by the Thackston '513 patent or the Scott '480 patent taken in combination or separately.

The Scott '480 patent discloses a system for collecting and interpreting data reflecting the effect of at least one force acting on a structure. The system includes at least one structural moment detector carried by the structure for generating output signals in response to the force(s) acting on the structure, means for processing the output signals to modify the information content of the signals, and means for manipulating the processed signals to provide secondary signals that are responsive to the condition of the structure as a result of the application of the selected force. (See Col. 2, lines 13-27). In particular, the Scott '480 patent describes an aircraft structural integrity system that utilizes structural moment detectors (SMDs) to provide information concerning structural fatigue, active crack detection, overload conditions, load history and vibration to assess the status of the aircraft in various manners. The SMDs therefore act, in effect, as a damage counter by providing continuously updated real-time assessment of the remaining fatigue lifetime of the airframe. (See Col. 9, lines 35-68 and Col. 10, lines 1-23).

Like the Thackston '513 patent, the Scott '480 patent also does not teach or suggest design analysis of a component that includes determining whether the stress response of a finite element model of the component is within pre-selected limits, and, if not, then prompting modification of the design of the component or a user-defined parameter and regenerating the finite element model, as recited by independent claims 1, 23 and 45. The Scott '480 patent simply monitors the structural integrity of an existing airframe in real-time, it does not provide any means for testing the stress response of a finite element model of the structure or modifying the design of the structure, let alone prompting modification of the design, unlike independent claims 1, 23 and 45.

Furthermore, although the SMDs described in the Scott '480 patent permit real-time, continuous updating of the remaining fatigue lifetime of a structure, it does not disclose converting the stress response of a finite element model to a fatigue life for the structure and comparing that fatigue life to a target fatigue life for the structure, as recited by dependent claims 2, 25 and 46. Additionally, the Scott '480 patent does not disclose prompting modification of the model by determining which aspects of the design and/or a user-defined parameter for the model caused the fatigue life for the model to be shorter than the target fatigue life, as recited by dependent claims 3, 26 and 47. Continuously updating an actual remaining fatigue lifetime for an existing structure is a different concept than the claimed invention's comparison of a fatigue life for a model to a target fatigue life to provide an assessment of the performance of a design model and to provide information that can be utilized to prompt certain modifications of the model so that the modified model design will have a fatigue life closer to the target fatigue life. Thus, the structure being evaluated as described in the Scott '480 patent cannot be modified, its actual performance can only be monitored, unlike the model described in the claimed invention. Therefore, the Scott '480 patent does not teach or suggest design analysis of a component that includes determining whether the stress response of a finite element model of the component is within pre-selected limits, and, if not, then prompting modification of the design of the component or a user-defined parameter and regenerating the finite element model, as recited by independent claims 1, 23 and 45. The Scott '480 patent also does not teach or suggest converting the stress response of a finite element model to a fatigue life for the structure and comparing that fatigue life to a target fatigue life for the structure, as recited by dependent claims 2, 25 and 46 or prompting modification of the model by determining which aspects of the design and/or a user-defined parameter for the model caused the fatigue life for the model to be shorter than the target fatigue life, as recited by dependent claims 3, 26 and 47.

Accordingly, none of the references, taken either individually or in combination, teach or suggest the method, system and computer program product for design analysis of a component of independent claims 1, 23 and 45. In particular, none of the cited references, taken either individually or in combination, teach or suggest design analysis of a component that includes determining whether the stress response of a finite element model of the component is within

pre-selected limits, and, if not, then prompting modification of the design of the component or a user-defined parameter and regenerating the finite element model. Since the independent claims are patentably distinct from the cited references, taken either individually or in combination, the claims that depend therefrom are also patentably distinct from the cited references for at least the same reasons since the dependent claims include each of the elements of a respective independent claim. Consequently, Applicant submits that, for at least those reasons set forth above, the rejections of the claims under 35 U.S.C. § 103(a) are therefore also overcome.

CONCLUSION

In view of the amendments and the remarks presented above, it is respectfully submitted that all of the present claims of the present application are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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